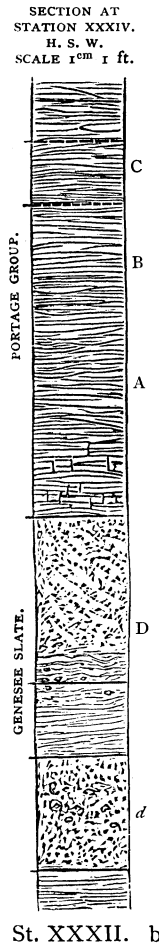
Ambocœlia umbonata, Con. was found in several beautifully preserved specimens.

And one of the dorsal valves is marked on the outer surface by concentric rows of minute short interrupted radiating lines, and when magnified resembles very closely the figure of *Spirifer prematura* on plate 33 of Hall's Pal., of N. Y., Pal. 4, fig. 32. Further study of these forms will probably develope interesting facts.



Avicula speciosa, Hall. This species is represented by several specimens small and large, some of quite large size, but showing the characteristics of the Portage representatives.

This fact is especially interesting as the form has not been recorded from outside Portage rocks, and though this stratum is but a few feet below the base of the Portage, it is distinctly below and in the midst of characteristic Genesee slate.

It will be observed that this brings the species into the Hamilton Period. There are also some well marked plant-remains, one linear grass-like form, another sturdy branching form the relations of which have not been made out.

The dip of the base of the Portage in one direction was determined. Three stations were examined a thousand feet apart, and in nearly a straight line running North and South, and the elevation of the base of the stratum A of the Portage determined relative to the level of the lake.

St. XXXII. base of A above lake level..... 7 ft.
" XXXIII. " " " ..... 35½ "
" XXXIV. " " " ..... 57·9 "

These being 1000 feet apart, the dip is nearly 50 feet in 2000 feet.

The first 1000 feet showing 28½ feet and the second 1000 feet showing 22½ feet nearly. Thus the dip is not uniform, a fact further shown by a study of the rocks further South where the dip is much less, as was determined by careful survey of strata near the top of the Portage.

The accompanying diagram shows the general nature of the section at the three stations XXXII., XXXIII., and XXXIV. The scale is one centimeter to the foot. C, and A, and lower part of B contain concretionary nodules of iron pyrites; A, and C, sandstones, are separated by the shale B, which is more or less arenacious and differs decidedly from the Genesee slate below, which is the characteristic mud shale, black, and very fine in texture with arenaceous streaks in it toward the top.

The fossiliferous stratum whose fauna is described, is *d*, lithologically scarcely defined from the shales above and below.

THE TELEPHONE AMONG THE INDIANS.

The United States Fish Commission has lately connected, by telephone, its Salmon Hatching Stations at Baird, on the McCloud river, California, with the establishment for breeding the California trout five miles further up the river and the apparatus is now in thoroughly good working order. The Indians look on in blank amazement and call the instrument the *Klesch-teen*, or speaking spirit.

A REMARKABLE METEOR.

By Edwin F. Sawyer.

While engaged in recording meteors on the evening of Oct. 9th, I observed a very remarkable one at 10 h. 25 m. C. M. T., low down in the east, which calls for special mention. My attention was first attracted to what appeared a stationary meteor > 1 mag. near γ (Gamma) Orionis, and of a deep orange color. While noting its accurate position, the meteor very slowly (motion hardly perceptible) began to descend towards the horizon, where it disappeared behind some houses. It remained perfectly stationary for at least a second after it was first observed, and it occupied 6 seconds in traversing an observed path of 10°. The meteor's brightness decreased slowly as it approached the point of disappearance being at this point of the 3d mag. No streak was observed. The exact point of appearance was at R.A. 76°+5° and it vanished at R.A. 76½°—5° near β Orioms (Rigel). Duplicate observations of this meteor would be of value.

Cambridgeport, Mass., Oct. 10, 1880.

THE "YELLOWS" OF THE PEACH TREE.

By Prof. T. J. Burrill, Illinois Industrial University.

A peculiar disease of the peach tree known as the "yellows," has long been the scourge of the principal peach growing districts of our country. Its appearance somewhat recently, in Michigan, caused much alarm, and since its occurrence throughout great orchards in some of the best fruit districts of the State, special attention has been called to it.

In "Science" for September 25th, 1880, page 162, there appeared an abstract of a paper read by me before the American Society of Microscopists at Detroit, upon the blight of pear and apple trees. In this paper I expressed the opinion that the "yellows" of the peach tree would be found due to an organism similar to that found to be the cause of the pear tree blight. This opinion was based upon my knowledge of the latter disease, upon the thoroughly confirmed contagious character of the "yellows," and upon the failure of competent investigators to find, after extended re-

search, any thing like the ordinary parasitic fungi. It was long ago conceded by entomologists that the disease did not arise from the depredations of insects.

I am now able to confidently assert that this devastating disease of the peach is caused by Bacteria!

These minute, moving, living things are found in great numbers within the cells of the diseased tree. They are apparently specifically different from those of the pear tree, being comparatively much more slender. What I take to be the typical form—all vary considerably—is very nearly 1 μ by 3.5 μ (.0000343 in. by .0001202 in.), made up of several not very evident articulations. They rest in some stages nearly or quite motionless. and in this condition show a curious peculiarity of lying in ranks, side by side. In other periods of development they move in an unsteady, undulating manner with considerable rapidity; they turn, twist and tumble on their sides, on end, now drifting with the current, now swarming in an inextricable maze in the field of a first-class one-tenth objective.

As the Bacteria increase the starch grains, stored by the tree for its own nourishment disappear, and I doubt not further investigation will prove that, as in the blight of the pear and apple, butyric fermentation takes place. The diseased tree probably suffers in other ways from the presence of these minute parasites, but we may say with truth that it really starves to death. Its food, gathered from the earth and air, assimilated by the leaves and stored for immediate or future use, is ruthlessly seized upon and destroyed. No doubt this takes place at all times of the year, when the temperature of the surrounding air is considerably above the freezing point; but the Bacteria are probably most active in the summer time.

Judging from my experiments upon the pear tree, the destroyers only gain entrance to the tissues of the tree through wounds in the epidermis or bark; but it is possible that at the time of flowering they penetrate by way of the stigma, which is not protected by an impervious coating.

The cellulose tissue of the tree is not destroyed, and it is still a puzzle how the Bacteria, minute as they are, pass from cell to cell. As in the pear, it is probably a very slow process, and is not connected with the circulation of fluids in the tissues.

The discovery of Bacteria as the cause of disease in plants may prove a notable contribution to the "germ theory" of disease in animals.

THE ANTIQUITY OF MAN IN EASTERN AMERICA, GEOLOGICALLY CONSIDERED.*

By HENRY CARVILL LEWIS, A. M.

In the course of an investigation of the surface geology of southeast Pennsylvania, the writer has determined some facts, regarding one of the gravels, which, bearing directly upon the antiquity of man in America, become of interest. In former papers the writer has shown that the gravels of the Delaware Valley belong to several distinct ages; and if therefore at any place the remains of man are shown to occur, it will be important to know to which of these gravels they should be referred.

The surface formations of southeast Pennsylvania may be divided into five clays and four gravels. These are, beginning with the oldest: (1) *Jurasso-cretaceous* plastic clay, seen at Turkey Hill, Bucks Co.; (2) Tertiary clays of the "*Brandon Period*," associated with the iron ore, kaolin and lignite of the Montgomery County Valley; (3) "*Bryn Mawr gravel*," often found at elevations of 400 ft., characterized by the presence of an iron conglomerate and of pebbles of Potsdam, but never of Triassic rocks, and conjectured to be late Tertiary; (4) "*Branchtown clay*" of similar age; (5) "*Glassboro' gravel*," of latest Pleiocene age, found also on the watershed in New Jersey, between the Atlantic and the Delaware, and known by its pebbles of Niagara limestone and of other fossiliferous rocks; (6) "*Philadelphia red gravel*," of Champlain age, which contains numerous boulders of all materials, fragments of Triassic rocks, etc., which shows flow-and-plunge structures and wave action on a large scale, which rests on a decomposed gneiss, and which is confined to the river valley; (7) *Philadelphia brick clay*, which, with its boulders, rests upon the last, aud like it, appears to have been deposited by the waters of the melting nort hern glacier; (8) "*Trenton gravel*," a sandy river gravel forming the bed of the Delaware; (9) the modern *alluvial mud* now forming in the tidewater swamps.

Of these formations, one of the least conspicuous at Philadelphia is that now called the Trenton gravel. It is a true river gravel, rising here but a few feet above the water, and forming a quicksand when below water level. It is of gray color, and contains pebbles composed entirely of the rocks which form the upper valley of the river. Unlike older gravels, it has very few quartz pebbles, and its pebbles are generally flat. In the middle of the river at Philadelphia it is 100 ft. deep. On tracing this gravel up the Delaware it is found to rise higher above the river and to extend farther back from it as we proceed up stream. Thus, at Bristol it extends two miles back from the river, and is bounded by a well-marked hill, upon which rest the older gravels. At Trenton, the limit of tidewater, the narrow upland portion of the valley begins; and from there up this gravel is shallow, and confined to the river bed. The oceanic gravels trend across New Jersey, and are no more seen. Two surface formations alone remain—the river gravel of past glacial age, and the brick clay, with its boulders, of champlain age. The first lies within the last, and both can be traced up to the great terminal moraine near Belvidere. It is to be especially noted that the Trenton gravel is newer than a drift of champlain age. It is in this Trenton gravel, and in this gravel only, that traces of man are found.

The Trenton gravel at the locality which gives it its name, is remarkably well exposed. Trenton is at the point where a long narrow valley with continuous downward slope opens out into a wide alluvial plain, and where the rocky floor of the river suddenly descends below ocean level. It is here that the bulk of a gravel, swept down the upper valley, would, on meeting tidewater, stop in its course, and with its boulders be heaped up in a mass, immediately afterward to be cut through by the river. It was thus that a cliff of gravel 50 ft. high was here formed, the river having cut through the gravel instead of flowing upon it, as at Philadelphia. This explanation dispenses with the necessity of assuming, as some geologists have done, the submergence of the land by the ocean at the time of the deposition of the gravel. That Southern N. J. was at that time dry land is shown by the fact that this gravel at Trenton extends inland a few miles only, and having filled up a bar in the ancient flooded river, is bounded by hills of the older gravel which forms Southern N. J.

There are many facts indicating that the Trenton gravel is a true river gravel and not a glacial moraine, which are detailed in the present paper. The absence of glacial marks on the rocks, the stratified character of the gravel, the topography of its banks, the comparative amount of its erosian and the character of its materials, all point to the conclusion that it was deposited by a great flood of the river; and this, when taken in connection with the fact that it lies within a channel cut through gravel deposited by the waters of the melting glacier indicates a past glacial and comparatively recent age of the Trenton gravel.

The important bearing of this fact upon the antiquity of man on the Delaware, which, as will appear, depends directly upon the age of this gravel, is here apparent. Calculations based upon the erosive power of running water show that the time necessary for the river to cut through this gravel down to the rock need not have been long. On the

* Read before the A. A. A. S., Boston, 1880.